Preliminary/Contract Design

ONR - NAVSEA – OSD CREATE
SHIP DESIGN WORKSHOP
March 31, 2009

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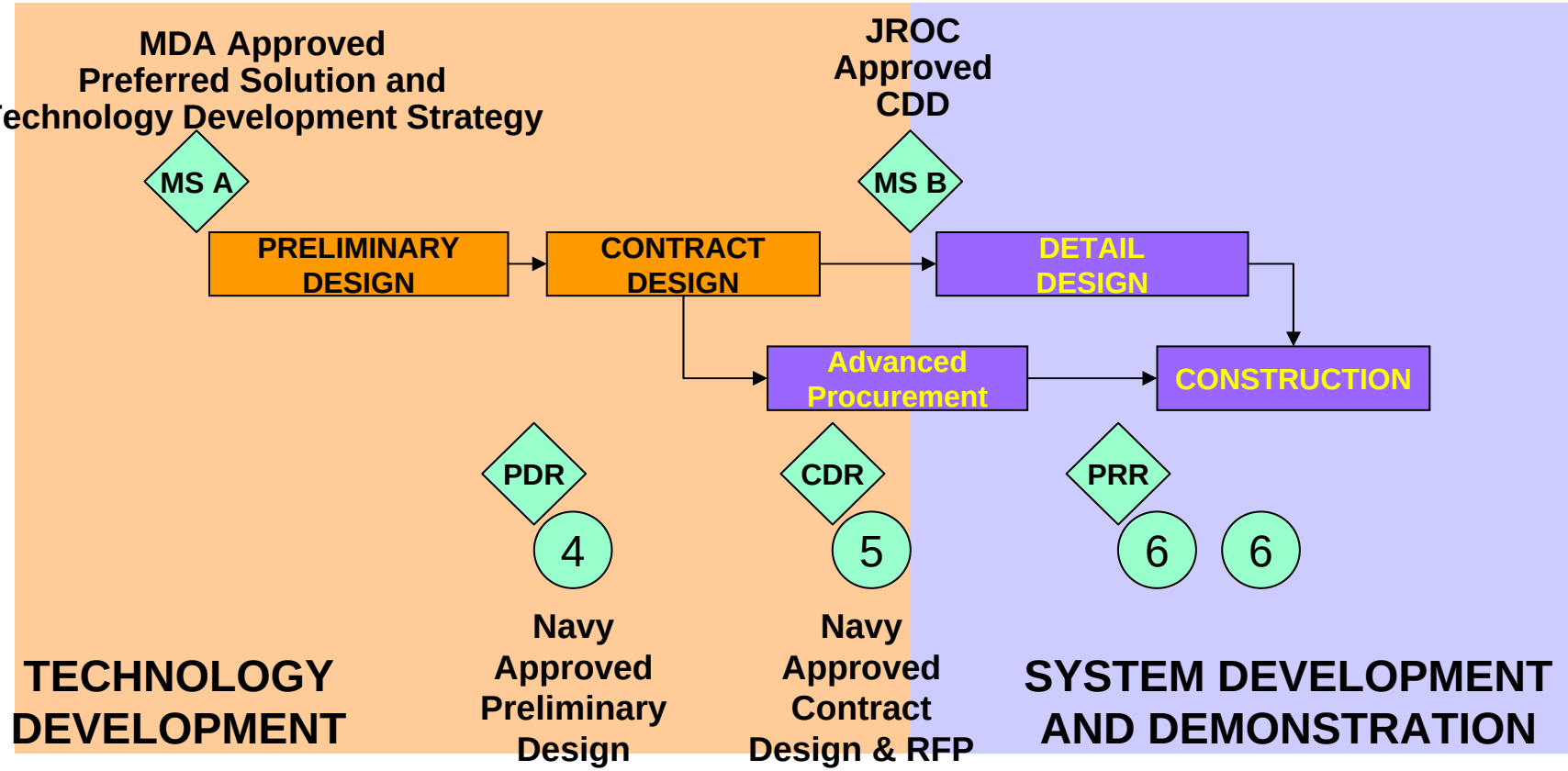
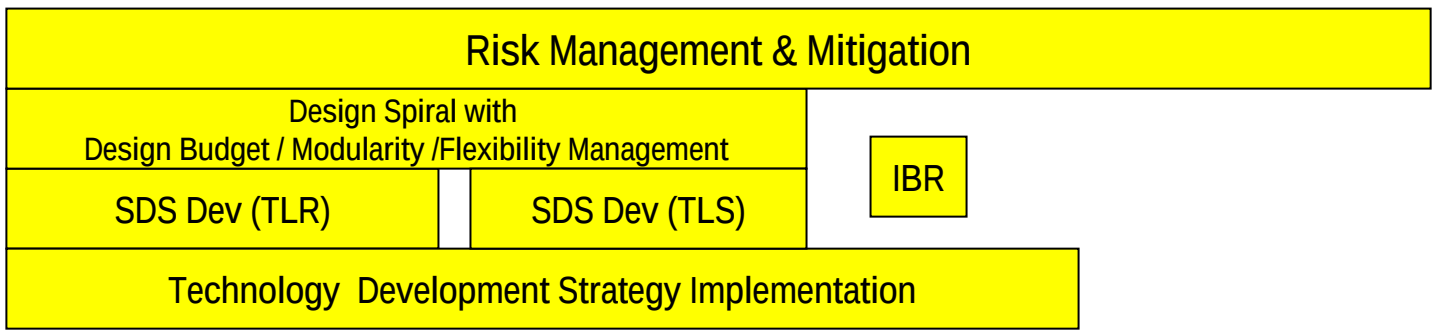
Proposed Implementation of SECNAVINST 5000.2D
PASS 2: PROGRAM OFFICE LEAD

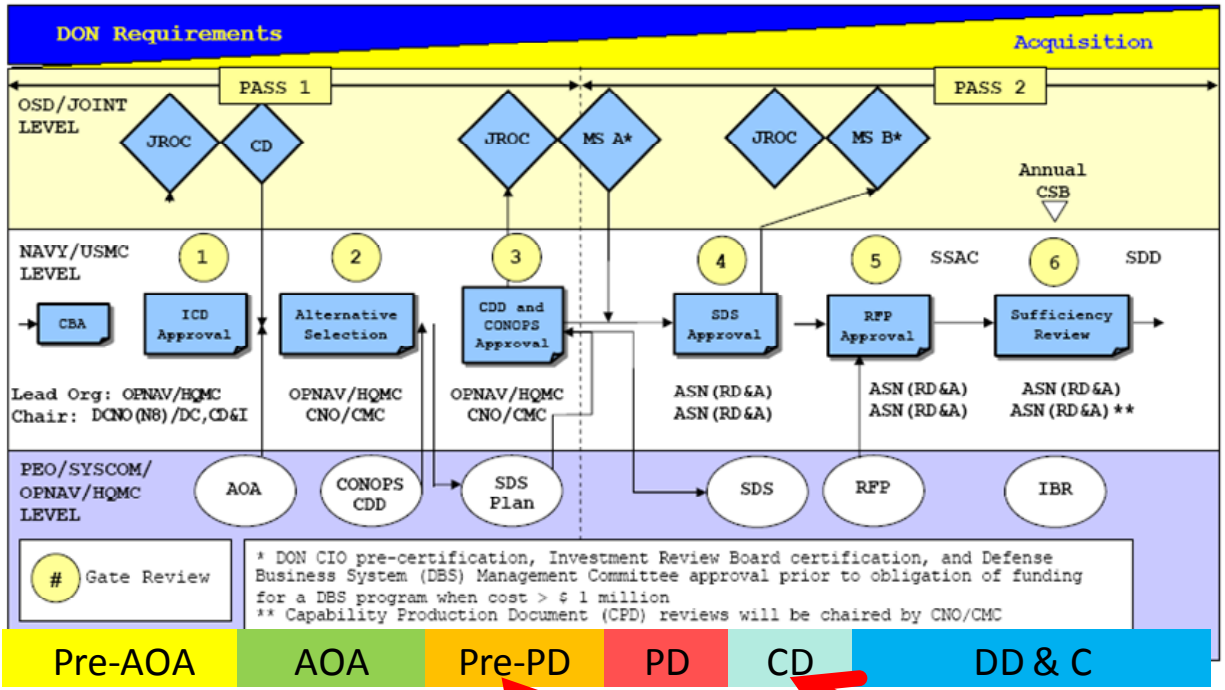


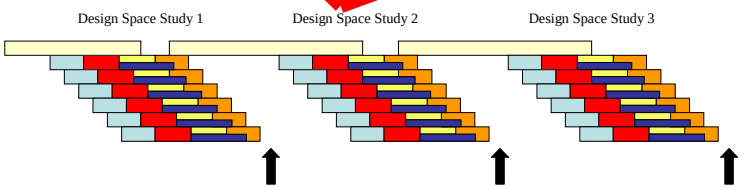


Design Stages and Expectations

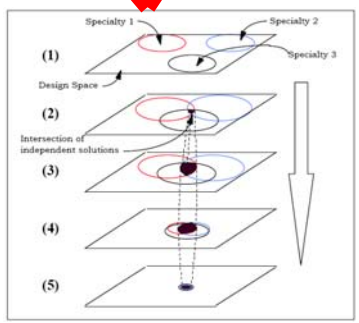
- **Preliminary Design**
  - Demonstrate design is balanced using physics based modeling
  - Ensure design is robust to potential disturbances caused by realized risks
  - Design is producible within the context of a given build strategy
  - Execute Risk Mitigation Plans
- **Contract Design**
  - Continue to ensure design is balanced using physics based modeling.
  - Adjust design in response to problems (i.e. realized risks) and adjustments in the build strategy.
  - Ensure design is to the level of fidelity such that any remaining degrees of freedom within one construction unit do not impact other construction units.
  - Execute Risk Mitigation Plans.
  - Translate Design into a contract package
- **Detail Design**
  - Adjust design in response to problems and the particular build strategy of the shipyard.
  - Produce drawings and products to support material procurement and fabricating construction units.
  - Use physics based modeling as needed to confirm that the design meets requirements.

Design Methods and Design Stages

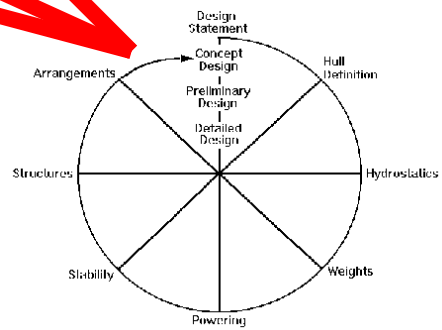




Synthesis Model based Design Optimization

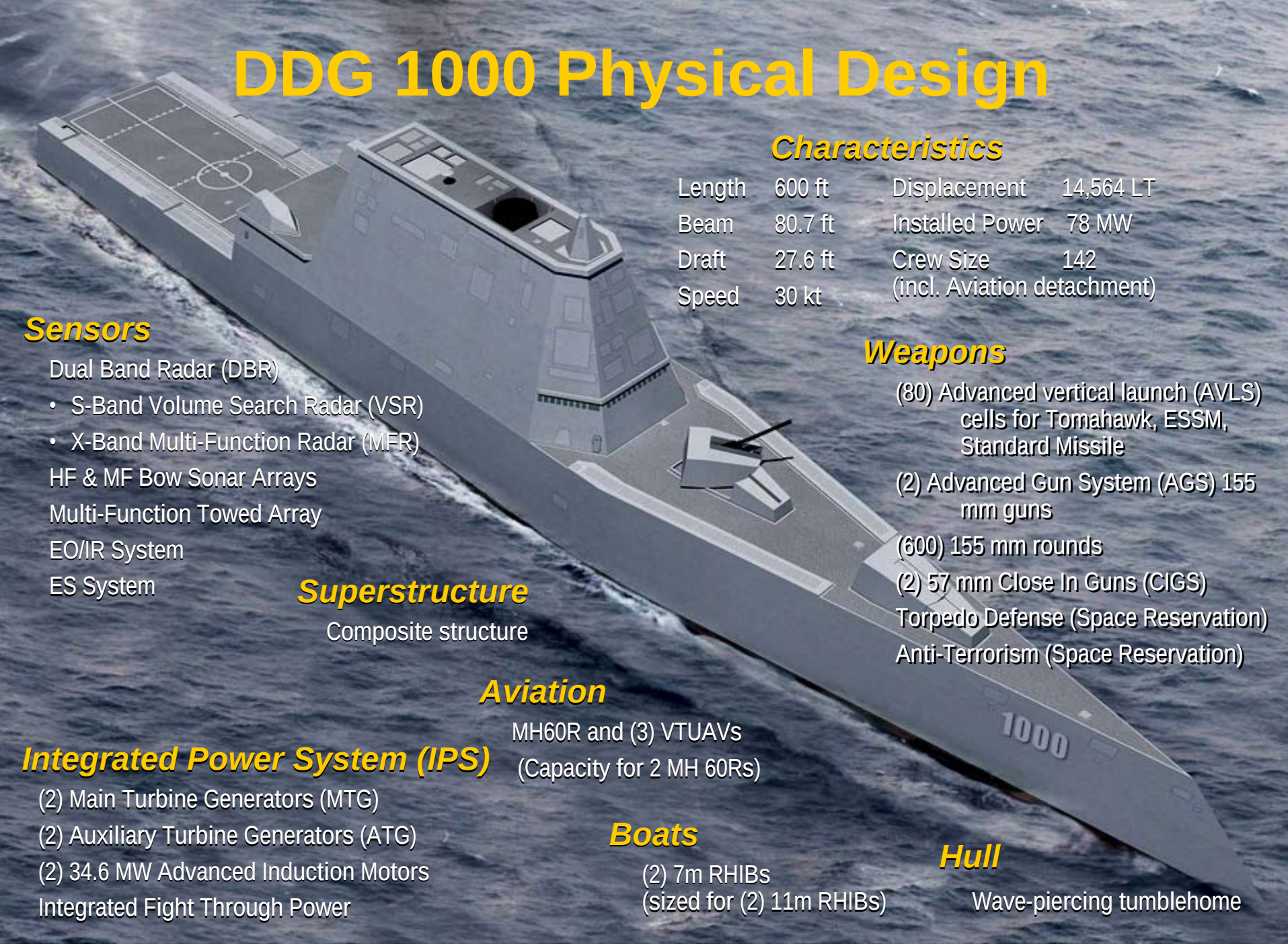


Set Based Design



Spiral Design

DDG 1000 Physical Design



Characteristics

Length	600 ft	Displacement	14,564 LT
Beam	80.7 ft	Installed Power	78 MW
Draft	27.6 ft	Crew Size (incl. Aviation detachment)	142
Speed	30 kt		

Sensors

Dual Band Radar (DBR)

- S-Band Volume Search Radar (VSR)
- X-Band Multi-Function Radar (MFR)

HF & MF Bow Sonar Arrays

Multi-Function Towed Array

EO/IR System

ES System

Weapons

(80) Advanced vertical launch (AVLS) cells for Tomahawk, ESSM, Standard Missile

(2) Advanced Gun System (AGS) 155 mm guns

(600) 155 mm rounds

(2) 57 mm Close In Guns (CIGS)

Torpedo Defense (Space Reservation)

Anti-Terrorism (Space Reservation)

Superstructure

Composite structure

Aviation

MH60R and (3) VTUAVs

(Capacity for 2 MH 60Rs)

Integrated Power System (IPS)

(2) Main Turbine Generators (MTG)

(2) Auxiliary Turbine Generators (ATG)

(2) 34.6 MW Advanced Induction Motors

Integrated Fight Through Power

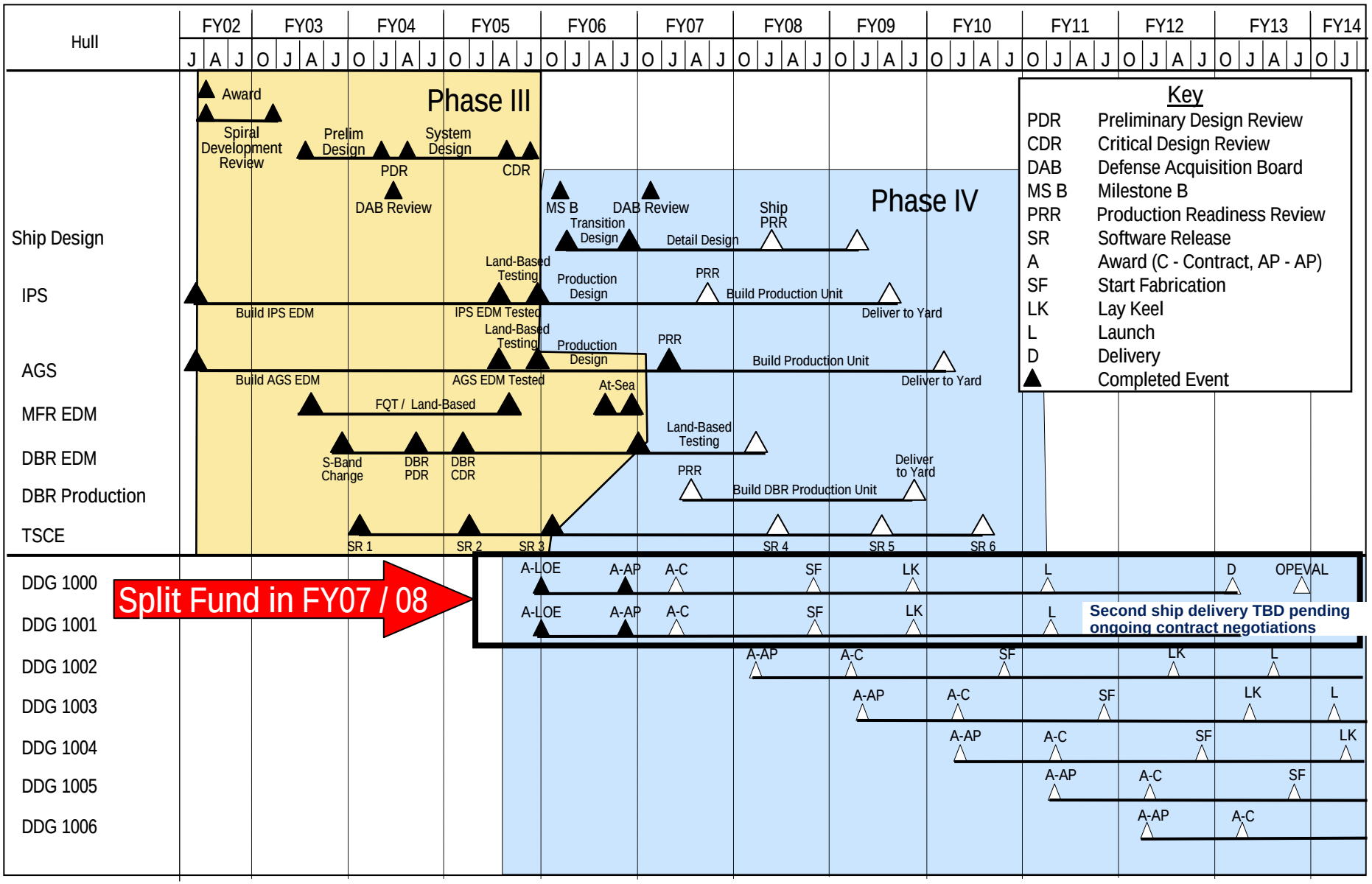
Boats

(2) 7m RHIBs
(sized for (2) 11m RHIBs)

Hull

Wave-piercing tumblehome

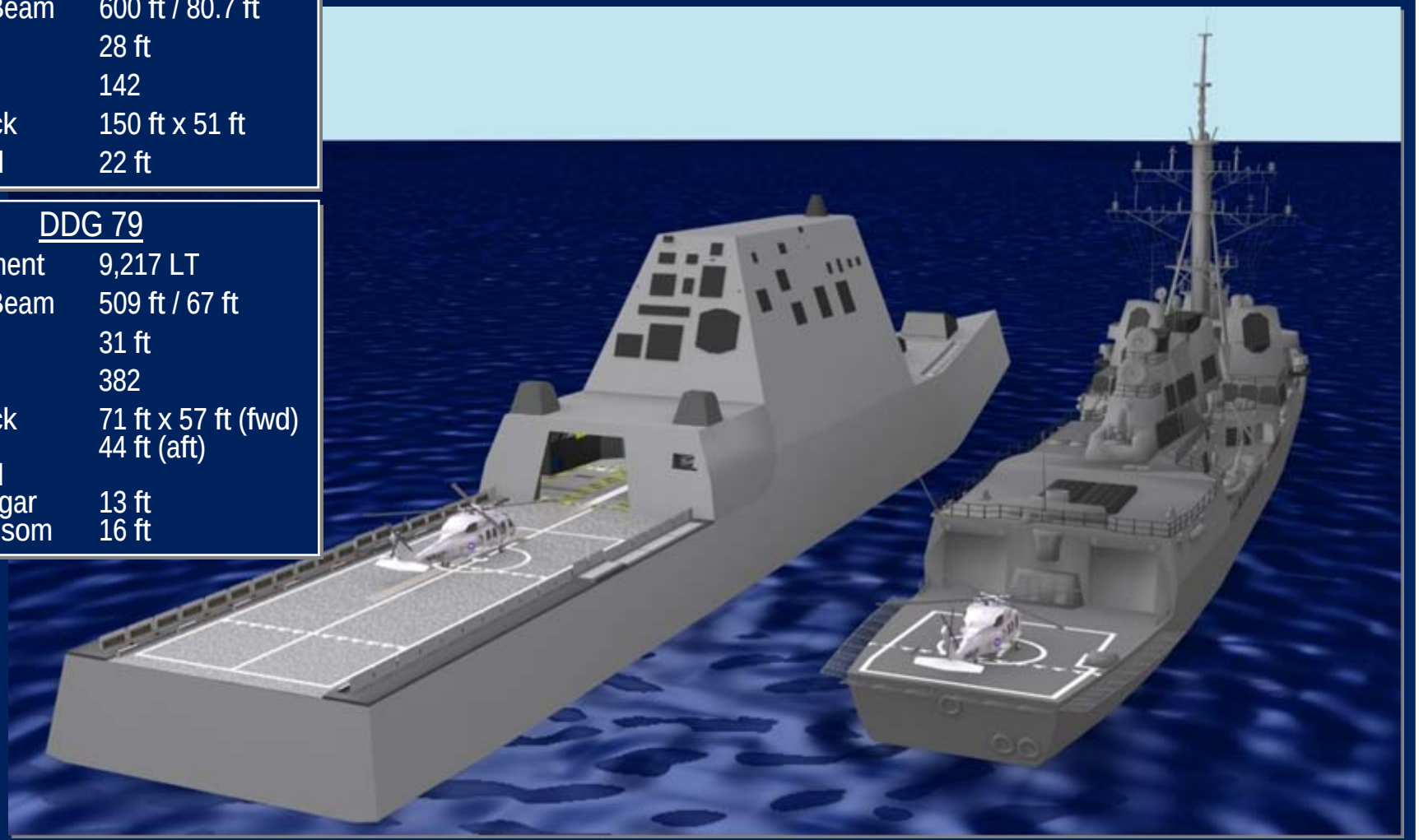
DDG 1000 Program Schedule



DDG 1000 / DDG 51 Flight IIA Comparison

DDG 1000	
Displacement	14,564 LT
Length / Beam	600 ft / 80.7 ft
Draft	28 ft
Crew Size	142
Flight Deck	150 ft x 51 ft
Freeboard	22 ft

DDG 79	
Displacement	9,217 LT
Length / Beam	509 ft / 67 ft
Draft	31 ft
Crew Size	382
Flight Deck	71 ft x 57 ft (fwd) 44 ft (aft)
Freeboard	
at hangar	13 ft
at transom	16 ft



DDG 1000 Critical Technologies

Infrared Mockups (IR)

- Land-based suppressor testing complete
- At-sea panel testing complete

Integrated Composite Deckhouse & Apertures (IDHA)

- RCS testing complete
- Co-site testing complete

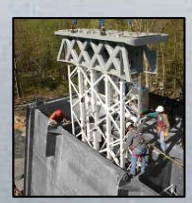
Advanced Gun System (AGS)

- Initial guided flight testing complete
- Land-based testing complete

Dual Band Radar (DBR)

- MFR sea-based testing complete
- VSR final land based assembly complete

Small Boat Demo



Peripheral Vertical Launch System (PVLS) / Advanced VLS

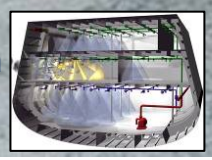
- Two detonation tests conducted
- Missile restrained firing testing complete

Integrated Power System (IPS)

- Component factory testing complete
- Critical Test Parameters (CTPs) complete

Autonomic Fire Suppression System (AFSS)

- At-sea weapons effect and autonomic fire suppression testing demonstrated



Total Ship Computing Environment (TSCE)

- Software Releases 1, 2, and 3 successfully coded, tested, and authorized by the Government
- Release 4 coding in progress

Hull Form Scale Model

- Performance validated by model testing
- UNDEX testing

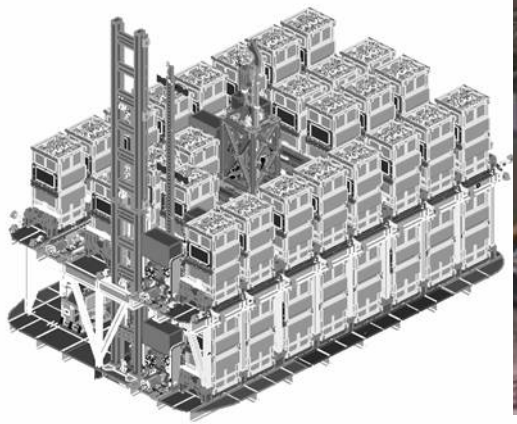
Integrated Undersea Warfare (IUSW)

- At-sea mine avoidance testing complete
- Automation testing complete

Advanced Gun System (AGS) & Magazine

Accomplishments

- Component testing to validate design
  - Gun and Magazine single axis testing (SAT), multi-axis testing (MAT), and factory acceptance testing (FAT) complete
- Gun mount and magazine integrated testing at Dugway, UT Land-Based Test Site
  - Verified maximum rate of fire of 10 rounds per minute
  - Verified maximum rate of fire in 8-round bursts
  - Verified magazine capable of unloading all 8 complete rounds from pallet in 45 seconds or less



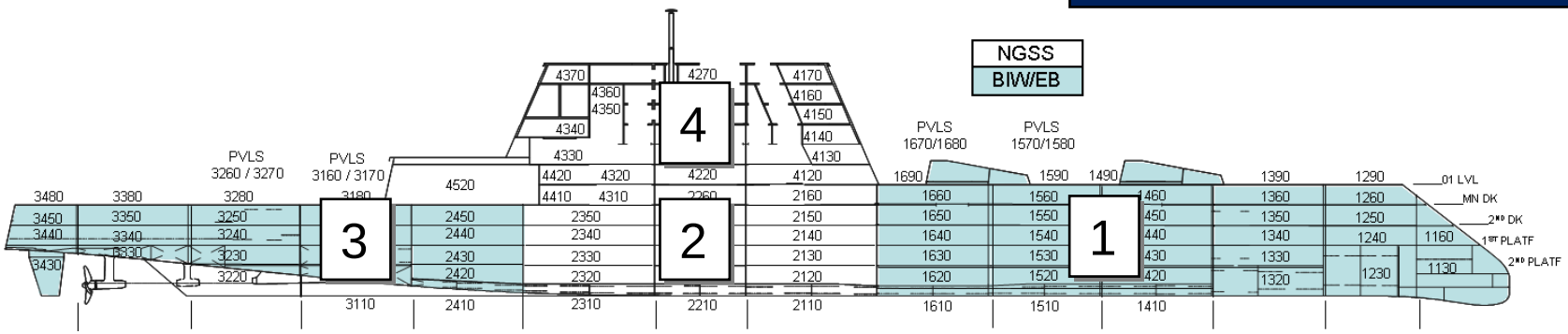
Design Work Split – BIW and NGSS

- **BIW and NGSS have split the ship geometrically by design zone**
- **NGSS is responsible for Areas 2 and 4**
- **BIW is responsible for Areas 1 and 3**

3-D Zone Design

For each zone includes:

- 3-D modeling and final design of structure
- Equipment arrangements and foundation design
- Distributive systems design and routing



- **Three dimensional Computer-Aided Design (CAD) tool**
  - **Tool integrates all hull, mechanical, electrical / electronic systems**
  - **Facilitates use of common parts and material**
- **Common repository for all design data with Interface to TeamCenter**
- **Common database for interference and penetration management**
- **Anticipate significant reduction in Type II changes as a result of a robust Design / Build process and a mature tool set**